Copy for the Elected Office (EO/US)

PCT/GB99/01997

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

To:

WATKINS, Rosalind
Swindell & Pearson
48 Friar Gate
Derby DE1 1GY
ROYAUME-UNI

Date of mailing (day/month/year)
04 August 2000 (04.08.00)

Applicant's or agent's file reference
RW/6863INT

IMPORTANT NOTIFICATION

International application No.
PCT/GB99/01997

International filing date (day/month/year)
25 June 1999 (25.06.99)

1. The following indications appeared on record concerning:

[X] the applicant [ ] the inventor [ ] the agent [ ] the common representative

Name and Address
UNIVERSITY OF DERBY
Kedleston Road
Derby DE22 1GB
United Kingdom

State of Nationality: GB
State of Residence: GB
Telephone No.:
Facsimile No.:
Teleprinter No.:

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[X] the person [ ] the name [ ] the address [ ] the nationality [ ] the residence

Name and Address
UNIVERSITY OF EAST ANGLIA
Norwich
NR4 7TJ
United Kingdom

State of Nationality: GB
State of Residence: GB
Telephone No.:
Facsimile No.:
Teleprinter No.:

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[X] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer
Sean Taylor

Telephone No.: (41-22) 338.83.38

Form PCT/IB/306 (March 1994)

003450082

.TENT COOPERATION TRE Y

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 02 March 2000 (02.03.00)	
International application No. PCT/GB99/01997	**Applicant's or agent's file reference** RW/6863INT
International filing date (day/month/year) 25 June 1999 (25.06.99)	**Priority date** (day/month/year) 27 June 1998 (27.06.98)
Applicant FINLAYSON, Graham	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

26 January 2000 (26.01.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Olivia RANAIVOJAONA

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:
WATKINS, Rosalind
Swindell & Pearson
48 Friar Gate
Derby DE1 1GY
ROYAUME-UNI

Date of mailing (day/month/year)	
06 January 2000 (06.01.00)	
Applicant's or agent's file reference RW/6863INT	**IMPORTANT NOTICE**
International application No. PCT/GB99/01997	**International filing date** (day/month/year) 25 June 1999 (25.06.99)
Priority date (day/month/year) 27 June 1998 (27.06.98)	
Applicant UNIVERSITY OF DERBY et al	

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
   AU,CN,EP,IL,JP,KP,KR,US

   In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
   AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CU,CZ,DE,DK,EA,EE,ES,FI,GB,GD,GE,GH,GM,HR,
   HU,ID,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MN,MW,MX,NO,NZ,OA,PL,PT,RO,RU,
   SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,UA,UG,UZ,VN,YU,ZA,ZW
   The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
   06 January 2000 (06.01.00) under No. WO 00/01164

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, **a demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer
J. Zahra

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
RW/6863INT		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 99/01997	25/06/1999	27/06/1998
Applicant		
UNIVERSITY OF DERBY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [X] **Unity of Invention is lacking** (see Box II).

4. With regard to the **title,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established by this Authority to read as follows:

   COLOUR IMAGE PICKUP APPARATUS

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 2

   [X] as suggested by the applicant.

   [ ] None of the figures.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 99/01997

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-27,32-37

   Alternative method for recording a scene

2. Claims: 1,28-31,38-53

   Means for providing information relating to the spectral characteristics of the illuminant light to remove demosaicing errors, interreflection errors or shadows.

INTERNATIONAL SEARCH REPORT

International Application No
[redacted]GB 99/01997

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N9/73 H04N9/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 045 928 A (TAKAIWA KAN ET AL) 3 September 1991 (1991-09-03)	1-7,11, 14,15, 28,29, 31-38,42
Y	column 7, line 15 -column 8, line 54; figure 6	39-41, 43-46
X	EP 0 605 898 A (CANON KK) 13 July 1994 (1994-07-13) figures 2,18,26	1-21,23, 26, 32-37,42

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 January 2000	31 01. 2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	De Paepe, W

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	FINLAYSON G D ET AL: "CONSTRAINED LEAST-SQUARES REGRESSION IN COLOR SPACES" JOURNAL OF ELECTRONIC IMAGING,US,SPIE + IS&T, vol. 6, no. 4, page 484-493 XP000722192 ISSN: 1017-9909	39-41, 43-46
A	the whole document	47-58

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 99/01997

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5045928 A	03-09-1991	JP 1269385 A	26-10-1989
		JP 2696904 B	14-01-1998
		JP 1270481 A	27-10-1989
EP 0605898 A	13-07-1994	JP 6217079 A	05-08-1994
		JP 6205158 A	22-07-1994
		JP 6204445 A	22-07-1994
		DE 69317752 D	07-05-1998
		DE 69317752 T	03-09-1998
		EP 0809298 A	26-11-1997
		KR 9711763 B	15-07-1997
		US 5453611 A	26-09-1995
		US 5801373 A	01-09-1998

PATENT COOPERATION TREATY

From the INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

WATKINS, R.
Swindell & Pearson
48 Friar Gate
Derby DE1 1GY
GRANDE BRETAGNE

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	27.10.2000
Applicant's or agent's file reference	IMPORTANT NOTIFICATION
RW/6863INT	
International application No.	International filing date *(day/month/year)*
PCT/GB99/01997	25/06/1999
Priority date *(day/month/year)*	27/06/1998

Applicant
UNIVERSITY OF EAST ANGLIA et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/
European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer
SCHALINATUS, D
Tel.+49 89 2399-8242

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
RW/6863INT		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB99/01997	25/06/1999	27/06/1998
International Patent Classification (IPC) or national classification and IPC H04N9/73		
Applicant UNIVERSITY OF EAST ANGLIA et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 12 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☒ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
26/01/2000	27.10.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Schoeyer, M Telephone No. +49 89 2399 2136

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/01997

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-21 as originally filed

Claims, No.:

1-56 with telefax of 09/10/2000

Drawings, sheets:

1/4-4/4 as originally filed

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 52-56.

because:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/01997

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 52-56 are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

   ☐ restricted the claims.

   ☒ paid additional fees.

   ☐ paid additional fees under protest.

   ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with.

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

   ☐ all parts.

   ☒ the parts relating to claims Nos. 1-51.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/01997

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1-4,6-10,12-20, 26,31-35,45-51
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-53
Industrial applicability (IA)	Yes:	Claims	1-53
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

INTERNATIONAL PRELIMINARY EXAMINATION REPORT - SEPARATE SHEET International application No. PCT/GB99/01997

III. No Opinion

It is not clear which subject-matter the applicants intend to protect in claims 52-56 because no technical features are defined in these claims. Thus no sensible opinion may be given for these claims.

IV. Lack of Unity

The International Preliminary Examining Authority agrees with the International Searching Authority that the present application relates to a group of inventions which are not so linked as to form a single inventive concept. Thus the requirements of Rule 13 PCT are not fulfilled (see also Form PCT/ISA/206 of 6 October 1999).

In particular it is noted that document D1 (EP-A-0 605 898) is concerned with an apparatus for processing an image and that the apparatus comprises (see column 2, line 49 ff.):
- optical sensor means for recording a first digital image of at least a part of the scene illuminated by an illuminant light and for recording a second digital optical image of at least a part of substantially the same scene under substantially the same illuminant light;
- the light producing the first and second images undergoing different optical processing; and
- means in communication with the optical sensor means for processing information relating to first and second images;
- processing means relates first and second images, -see D1 (page 9, column 16, lines 26-39).

Since these are the technical features of claim 1, the subject-matter of this claim lacks novelty.

Claim 31 is directed towards a method in accordance with the apparatus of claim 1 so that substantially the same objections as of lack of novelty with were made for claim 1 apply to claim 31.

The following groups of claims were identified by the International Searching Authority:

1. Claim 1 with claims 2-26, claim 31 with claims 32-35;
2. Claim 1 with claims 27-30, claim 31 with claims 36-44, claims 45-51.

Since according to the above, the subject-matter of independent claims 1 and 31 lacks novelty, the common concept linking these groups of claims and which are represented by the subject-matter of independent claims 1 and 31 is not inventive.

Consequently, since the claims according to group 1 and group 2 do not share the same inventive concept, if any, (group 1 relates to a method of recording a scene, group 2 relates to the spectral characteristics of the illuminant light), the requirements of Rule 13.1 PCT are not fulfilled that the groups of inventions should be linked by a single inventive concept.

As the applicants have paid the additional examination fees without protest, the claims 1-51 have been considered for this report.

V. Statement under Rule 66.2(a)(ii)

Reference is made to the following documents:

D1: EP-A-0 605 898;
D2: US-A-5 045 928.
D3: FINLAYSON G D ET AL: 'CONSTRAINED LEAST-SQUARES REGRESSION IN COLOR SPACES' JOURNAL OF ELECTRONIC IMAGING,US,SPIE + IS&T, vol. 6, no. 4, page 484-493 XP000722192 ISSN: 1017-9909

Article 33(2) PCT

Document D1 is concerned with an apparatus for processing an image which comprises (see column 2, line 49 ff.):

- optical sensor means for recording a first digital image of at least a part of the

scene illuminated by an illuminant light and for recording a second digital optical image of at least a part of substantially the same scene under substantially the same illuminant light;
- the light producing the first and second images undergoing different optical processing; and
- means in communication with the optical sensor means for processing information relating to first and second images;
- processing means relates first and second images, -see D1 (page 9, column 16, lines 26-39).

Since these are the technical features of claim 1, the subject-matter of this claim lacks novelty.

In a similar fashion the subject-matter of claim 1 is anticipated by D2 (see column 7, lines 15-44; claim 1).

Claim 31 is directed towards a method in accordance with the apparatus of claim 1 so that substantially the same objections as of lack of novelty with were made for claim 1 apply to claim 31.

Document D3 is concerned with recording an image and processing the recorded image, the method including the calibration steps of:

- storing a digital response to each of the plurality of colours of illuminant $E(\lambda)$ (see section 2.1);
- grouping each colour of illuminant $E^a(\lambda)$ into a pair with a different colour of illuminant $E^b(\lambda)$, and calculating the transform function (see sections 2 and 3);

Since these are the technical features of claim 45, the subject-matter of this claim lacks novelty.

Dependent claims:

The subject-matter of some of the dependent claims also lacks novelty because the subject-matter of these claims is disclosed by D1 or D2 as will be set out

below:

- processing means correlates the first and second images (as in claim 2) , -see D2 (claim 1);
- first and second optical sensor means are provided for recording first und second images (as in claim 3) , -see D2 (figure 5);
- at least one of first and second optical sensor means is relatively broadband (as in claim 4) , -see D2 (figure 5);
- sensor means includes at least two types of optically sensitive elements (as in claim 6), -see D1 (column 9, lines 13-23);
- sensor means comprises a CCD (as in claim 7), -see D1 (column 1, lines 17-23);
- broad response centering on a particular wavelength (as in claim 8), -see D1 (column 2, line 35 ff.);
- optical processing means comprises an optical filter (as in claims 9, 10), -see D1 (column 2, line 35 ff.);
- filter response is smooth (as in claim 12), -see D1(figures 2-4);
- filter produces an output which includes relatively more light of one wavelength than of another (as in claim 13), -see D1 (e.g. figure 4);
- filter is located in image light path (as in claim 14), -see D1 (column 2, line 35 ff.)
- single CCD chip (as in claim 15), -see D2 (figure 5);
- 1st and 2nd sensor means may comprise different parts of the chip (as in claim 16), -see D2 (figure 6)
- first and second images comprises different parts of the recorded images (as in claim 17), -see D2 (figure 6);
- filter is provided in front of CCD chip such that 1st or 2nd image is recorded by that part of the chip and the other is recorded by the remainder (as in claim 18), -see D2 (figure 6);
- first CCD for first image, 2nd CCD for second image (as in claim 19), -see D2 (figure 5);
- chips are in close proximity (as in claim 20), -see D2 (figure 5);
- processing means are microprocessor based, having electrical memory means (as in claim 26), -see D2 (figures 5 and 6);

The subject-matter of dependent claims 32-35 lacks novelty for similar reasons as set out for the corresponding dependent apparatus claims, 2,10,6 and 17

respectively.

The subject-matter of claims 46-51 is also disclosed by D3. The operations of relating the different illuminants, and minimisation of the transform functions are all set out in sections 2-5 of D3.

Article 33(3) PCT

The subject-matter of some of the claims is considered to be obvious because the subject-matter of these claims is either known from the prior art documents D1-D3 or forms part of the common general knowledge of the skilled person. This will be set out below:

- wavelengths are at least 100nm apart (as in claim 5), -see D1 (column 9, lines 13-23);
- filter output is linearly related to its input (as in claim 11), -common design feature;
- CCD chips are responsive to substantially same frequencies (as in claim 21), - common general knowledge;
- use of beamsplitter (as in claim 21), -common general knowledge;
- filter in front of one of the CCD chips (as in claim 21), -common general knowledge;

Also the different housing arrangements as set out claims 22-24 are solutions the skilled person would readily apply, when confronted with the corresponding problem;

- chips are responsive to different frequencies of light (as in claim 25), - common general knowledge;
- provision of spectral characteristics of the illuminant light (as in claim 27), -see D3 (Section 2, Color Space Data Transforms);
- spectral characteristics are used to facilitate removal of some illuminant bias (as in claim 28), -see D3 (abstract);
- removal of demosaicing errors, interreflection or shadows (as in claim 29), - common general knowledge;
- use of physical characteristics of the scene (as in claim 30), -common general knowledge;

INTERNATIONAL PRELIMINARY EXAMINATION REPORT - SEPARATE SHEET

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The features of the subject-matter of claims 36-44 is obvious because of the common general knowledge of the skilled person and the features disclosed in D3. In particular reference is made to Section 2 of D3 ("Color Space Data Transforms).

INTERNATIONAL PRELIMINARY EXAMINATION REPORT - SEPARATE SHEET

International application No. PCT/GB99/01997

VII. Certain Defects

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D3 are not mentioned in the description.

2. Independent claims 1, 31 and 45 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

INTERNATIONAL PRELIMINARY EXAMINATION REPORT - SEPARATE SHEET

International application No. PCT/GB99/01997

VIII. Certain Observations

Article 6 PCT

The relative terms (relatively broadband) used in the claims leaves the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of the claims unclear (Article 6 PCT). In addition when considering the passage on page 2, lines 8-25, in which contrary statements about the sensor means are made, it is no clear what subject-matter the applicants intend to protect.

Claims

1. Image recording apparatus for processing an image, the apparatus including: optical sensor means for recording a first digital optical image of at least a part of a scene illuminated by an illuminant light and for recording a second digital optical image of at least a part of substantially the same scene under substantially the same illuminant light; the light producing the first and second images undergoing different optical processing; and means in communication with the optical sensor means for processing information relating to the first and second images.

2. Image recording apparatus according to claim 1 wherein the processing means relates one of the first and second images to the other of the first and second images.

3. Image recording apparatus according to claim 2 wherein the processing means correlates the first and second images.

4. Image recording apparatus according to any preceding claim wherein first and second optical sensor means are provided for recording the first and second images respectively.

5. Image recording apparatus according to claim 4 wherein at least one of the first and second optical sensor means is relatively broadband optical sensor means, being responsive to at least two distinct wavelengths of light within a broad spectrum of wavelengths.

6. Image recording apparatus according to claim 5 wherein the wavelengths are at least 100 nm apart.

7. Image recording apparatus according to any preceding claim wherein the optical sensor means includes at least two types of optically sensitive elements,

responsive to respectively different wavelengths of light.

8. Image recording apparatus according to any preceding claim wherein the optical sensor means comprises a charge coupled device (CCD) chip, the chip comprising an array of photoelectric detector pixels.

9. Image recording apparatus according to claim 8 wherein the pixels have a broad response centering on a particular wavelength of light.

10. Image recording apparatus according to claim 8 or claim 9 wherein the CCD chip is coated with a filter.

11. Image recording apparatus according to any preceding claim wherein the optical processing means comprises an optical filter.

12. Image recording apparatus according to claim 11 wherein the filter has characteristics such that its output is linearly related to its input.

13. Image recording apparatus according to claim 11 or claim 12 wherein the response of the filter is a smooth function with respect to wavelength and the filter has an average transmittance of more than 30%.

14. Image recording apparatus according to any of claims 11 to 13 wherein the filter produces an output which includes relatively more light of one wavelength than of another wavelength as compared with the input.

15. Image recording apparatus according to claims 11 to 14 wherein the filter is located in the image light path before the optical sensor means.

16. Image recording apparatus according to any preceding claim wherein first and second optical sensor means are provided by a single CCD chip which records the first and second digital optical images.

17. Image recording apparatus according to claim 16 wherein the first and second sensor means may comprise respectively different parts of the chip.

18. Image recording apparatus according to claim 16 or claim 17 wherein the first and second images comprise different parts of the image recorded by the CCD chip, in spatial terms or in terms of the frequencies of light recorded.

19. Image recording apparatus according to any of claims 16 to 18 wherein a filter is provided in front of or on a part of the CCD chip such that the first or second digital optical image is recorded by that part of the chip, and the other of the digital optical images is recorded by the remainder of the chip.

20. Image recording apparatus according to any of claims 1 to 15 wherein the optical sensor means comprises a first CCD chip for recording the first digital optical image and a second CCD chip for recording the second digital optical image.

21. Image recording apparatus according to claim 20 wherein the chips are located in close proximity to one another, in the same geometric plane.

22. Image recording apparatus according to claim 20 or claim 21 wherein the two CCD chips are responsive to respectively substantially the same frequencies of light, the optical processing means comprising an optical beamsplitter for splitting the image light into two parts and for directing each part of the light towards a respective one of the CCD chips, and an optical filter being located in the path of one part of the image light, before one CCD chip.

23. Image recording apparatus according to any of claims 20 to 22 wherein the optical sensor means and the optical processing means are located within a housing, such as a camera body.

24. Image recording apparatus according to any of claims 20 to 22 wherein each CCD chip is provided in a separate housing, a first housing having a CCD

chip provided therein and a second housing having a CCD chip and an optical filter provided therein.

25. Image recording apparatus according to any of claims 20 to 22 wherein a first CCD chip is provided within a first digital camera and a second CCD chip is provided within a second digital camera, such that the different optical processing of the two images results from the different camera characteristics.

26. Image recording apparatus according to any of claims 20 to 25 wherein the two chips are responsive to respectively different frequencies of light.

27. Image recording apparatus according to any preceding claim wherein the processing means is microprocessor based, having electrical memory means.

28. Image recording apparatus according to any preceding claim wherein the processing means includes means for providing information relating to the spectral characteristics of the illuminant light.

29. Image recording apparatus according to claim 28 wherein information relating to the spectral characteristics of the illuminant light is used to facilitate removal of at least some of any illuminant colour bias present in the recorded image.

30. Image recording apparatus according to claim 28 or claim 29 wherein the processing means includes means for facilitating the removal of at least some of any demosaicing errors and/or interreflection errors and/or shadows present in the recorded image.

31. Image recording apparatus according to any of claims 28 to 30 wherein the processing means includes means for providing information relating to the physics of the scene, such as the physical characteristics of the scene.

32. A method for recording an image, the method including the steps of:

(a) recording a first digital optical image of at least a part of a scene illuminated by an illuminant light and recording a second digital optical image of at least a part of substantially the same scene illuminated by substantially the same illuminant light; the light producing the first and second images undergoing different optical processing; and

(b) processing information relating to the first and second images.

33. A method for recording an image according to claim 32 wherein the processing step includes relating one of the first and second images to the other of the first and second images.

34. A method for recording an image according to claim 33 wherein the first and second images are correlated.

35. A method for recording an image according to any of claims 32 to 34 wherein different optical processing results at least partly from the filtering of light producing the first or second image.

36. A method for recording an image according to any of claims 32 to 35 wherein the different optical processing is provided by the use of sensors responsive to respectively different frequencies of light in recording the first and second images.

37. A method for recording an image according to any of claims 32 to 36 wherein the first and second images comprise respectively different parts of a global image of a scene.

38. A method for recording an image according to any of claims 32 to 37 wherein the processing of the information relating to the first and second images provides an estimate of the spectral characteristics of the illuminant light.

39. A method for calibrating image recording apparatus, the method being according to any of claims 32 to 38.

40. A method according to claim 39 wherein the method includes the carrying out of steps (a) and (b) for each of a plurality of different known illuminant lights and wherein step (b) includes the step of processing the information relating to the first and second images to provide an indication of the relationship therebetween.

41. A method according to claim 40 wherein the indication of the relationship is a transform function, which may be a transform matrix, and the method provides a set of reference transform functions, each transform function relating to a different known illuminant light.

42. A method according to any of claims 32 to 38 for processing an image recorded using image recording apparatus wherein the first and second images relate to a scene illuminated by an unknown illuminant.

43. A method according to claim 42 wherein the method includes the step of applying one or more of the reference transform functions to the first or second image and determining the reference transform function which best relates the two images.

44. A method according to claim 43 wherein each reference transform function is applied to the first image to produce a transformed first image, which is subsequently compared to the second image and the reference transform function which produces a transformed first image most closely resembling the second image is selected as the best reference transform function.

45. A method according to claim 44 wherein the known illuminant light to which the best reference transform function relates is determined, to provide information relating to the spectral characteristics of the light illuminating the

scene to be recorded.

46. A method according to claim 45 wherein at least some of the colour bias due to the illuminating light is removed from the image of the scene to be recorded and/or at least some demosaicing errors and/or interreflection errors and/or shadows present in the recorded image are removed.

47. A method for recording an image with image recording apparatus and processing the recorded image of a scene illuminated by an illuminant light, the method including calibration steps of:

storing a digital response of an image recording apparatus to each of a plurality of colours of illuminant light $E(\lambda)$, in an electrical memory means;

grouping each colour of illuminant $E^a(\lambda)$ into a pair with a different colour of illuminant $E^b(\lambda)$, and for each pair of illuminants $E^a(\lambda)$ and $E^b(\lambda)$, calculating an illuminant transform function $T^{a,b}$, the transform function being the function which best maps the image recording apparatus response across the pair of illuminants, and recording the transfer function in an electrical memory means.

48. A method according to claim 47 wherein the number of pairs of illuminants is the same as the number of distinct illuminants, the second illuminant in each pair being defined in terms of the first.

49. A method according to claim 47 including the step of recording the responses of the image recording apparatus for a set of distinct illuminants $E(\lambda)$.

50 A method according to any of claims 47 to 49, the method further including the following image recording steps:

recording the responses of the image recording apparatus to image light (P_1) from a scene to be recorded and to optically filtered image light (P_2) from the scene;

determining which colour of illuminant $E(\lambda)$ is closest to the colour of the

illuminating light, thereby estimating the colour of the illuminating light; and

removing at least some colour bias due to the illuminating light from the recorded image and/or at least some of any demosaicing errors and/or interreflection errors.

51. A method according to claim 50 wherein the optically filtered image light is filtered using a filter which produces an output which includes relatively more light of one wavelength than the input.

52. A method according to claim 50 or claim 51 wherein the colour of the illuminating light is determined by applying each transform function $T^{a,b}$ to the recorded response (P_1) of the apparatus to the image light and comparing the transformed response (P_1) to the response (P_2) of the apparatus to the filtered image light, the transform function which best relates the two responses being the function which identifies the colour of the image light and the filtered image light.

53. A method according to claim 52 wherein the best transform function is defined as the function which minimizes the error of the operation ($T^{a,b}P_1 - P_2$).

54. Image recording apparatus substantially as herein described with reference to Fig. 1 of the drawings.

55. Image recording apparatus substantially as herein described with reference to Fig. 2 of the drawings.

56. Image recording apparatus substantially as herein described with reference to Fig. 3 of the drawings.

57. A method substantially as herein described with reference to the drawings.

58. Any novel subject matter or combination including novel subject matter

disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.

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PATENT COOPERATION TREATY

PCT

REC'D 23 OCT 2000
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
RW/6863INT		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB99/01997	25/06/1999	27/06/1998
International Patent Classification (IPC) or national classification and IPC H04N9/73		
Applicant UNIVERSITY OF EAST ANGLIA et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 12 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☒ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

CORRECTED VERSION

Date of submission of the demand	Date of completion of this report
26/01/2000	27.10.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Schoeyer, M Telephone No. +49 89 2399 2136

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/01997

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-21 as originally filed

Claims, No.:

1-56 with telefax of 09/10/2000

Drawings, sheets:

1/4-4/4 as originally filed

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 52-56.

because:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/01997

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 52-56 are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

   ☐ restricted the claims.

   ☒ paid additional fees.

   ☐ paid additional fees under protest.

   ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with.

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

   ☐ all parts.

   ☒ the parts relating to claims Nos. 1-51.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/01997

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1-4,6-10,12-20, 26,31-35,45-51
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-53
Industrial applicability (IA)	Yes:	Claims	1-53
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

III. No Opinion

It is not clear which subject-matter the applicants intend to protect in claims 52-56 because no technical features are defined in these claims. Thus no sensible opinion may be given for these claims.

IV. Lack of Unity

The International Preliminary Examining Authority agrees with the International Searching Authority that the present application relates to a group of inventions which are not so linked as to form a single inventive concept. Thus the requirements of Rule 13 PCT are not fulfilled (see also Form PCT/ISA/206 of 6 October 1999).

In particular it is noted that document D1 (EP-A-0 605 898) is concerned with an apparatus for processing an image and that the apparatus comprises (see column 2, line 49 ff.):
- optical sensor means for recording a first digital image of at least a part of the scene illuminated by an illuminant light and for recording a second digital optical image of at least a part of substantially the same scene under substantially the same illuminant light;
- the light producing the first and second images undergoing different optical processing; and
- means in communication with the optical sensor means for processing information relating to first and second images;
- processing means relates first and second images, -see D1 (page 9, column 16, lines 26-39).

Since these are the technical features of claim 1, the subject-matter of this claim lacks novelty.

Claim 31 is directed towards a method in accordance with the apparatus of claim 1 so that substantially the same objections as of lack of novelty with were made for claim 1 apply to claim 31.

The following groups of claims were identified by the International Searching Authority:

1. Claim 1 with claims 2-26, claim 31 with claims 32-35;
2. Claim 1 with claims 27-30, claim 31 with claims 36-44, claims 45-51.

Since according to the above, the subject-matter of independent claims 1 and 31 lacks novelty, the common concept linking these groups of claims and which are represented by the subject-matter of independent claims 1 and 31 is not inventive.

Consequently, since the claims according to group 1 and group 2 do not share the same inventive concept, if any, (group 1 relates to a method of recording a scene, group 2 relates to the spectral characteristics of the illuminant light), the requirements of Rule 13.1 PCT are not fulfilled that the groups of inventions should be linked by a single inventive concept.

As the applicants have paid the additional examination fees without protest, the claims 1-51 have been considered for this report.

V. Statement under Rule 66.2(a)(ii)

Reference is made to the following documents:

D1: EP-A-0 605 898;
D2: US-A-5 045 928.
D3: FINLAYSON G D ET AL: 'CONSTRAINED LEAST-SQUARES REGRESSION IN COLOR SPACES' JOURNAL OF ELECTRONIC IMAGING,US,SPIE + IS&T, vol. 6, no. 4, page 484-493 XP000722192 ISSN: 1017-9909

Article 33(2) PCT

Document D1 is concerned with an apparatus for processing an image which comprises (see column 2, line 49 ff.):

- optical sensor means for recording a first digital image of at least a part of the

scene illuminated by an illuminant light and for recording a second digital optical image of at least a part of substantially the same scene under substantially the same illuminant light;
- the light producing the first and second images undergoing different optical processing; and
- means in communication with the optical sensor means for processing information relating to first and second images;
- processing means relates first and second images, -see D1 (page 9, column 16, lines 26-39).

Since these are the technical features of claim 1, the subject-matter of this claim lacks novelty.

In a similar fashion the subject-matter of claim 1 is anticipated by D2 (see column 7, lines 15-44; claim 1).

Claim 31 is directed towards a method in accordance with the apparatus of claim 1 so that substantially the same objections as of lack of novelty with were made for claim 1 apply to claim 31.

Document D3 is concerned with recording an image and processing the recorded image, the method including the calibration steps of:

- storing a digital response to each of the plurality of colours of illuminant $E(\lambda)$ (see section 2.1);
- grouping each colour of illuminant $E^a(\lambda)$ into a pair with a different colour of illuminant $E^b(\lambda)$, and calculating the transform function (see sections 2 and 3);

Since these are the technical features of claim 45, the subject-matter of this claim lacks novelty.

Dependent claims:

The subject-matter of some of the dependent claims also lacks novelty because the subject-matter of these claims is disclosed by D1 or D2 as will be set out

below:

- processing means correlates the first and second images (as in claim 2) , -see D2 (claim 1);
- first and second optical sensor means are provided for recording first und second images (as in claim 3) , -see D2 (figure 5);
- at least one of first and second optical sensor means is relatively broadband (as in claim 4) , -see D2 (figure 5);
- sensor means includes at least two types of optically sensitive elements (as in claim 6), -see D1 (column 9, lines 13-23);
- sensor means comprises a CCD (as in claim 7), -see D1 (column 1, lines 17-23);
- broad response centering on a particular wavelength (as in claim 8), -see D1 (column 2, line 35 ff.);
- optical processing means comprises an optical filter (as in claims 9, 10), -see D1 (column 2, line 35 ff.);
- filter response is smooth (as in claim 12), -see D1(figures 2-4);
- filter produces an output which includes relatively more light of one wavelength than of another (as in claim 13), -see D1 (e.g. figure 4);
- filter is located in image light path (as in claim 14), -see D1 (column 2, line 35 ff.)
- single CCD chip (as in claim 15), -see D2 (figure 5);
- 1st and 2nd sensor means may comprise different parts of the chip (as in claim 16), -see D2 (figure 6)
- first and second images comprises different parts of the recorded images (as in claim 17), -see D2 (figure 6);
- filter is provided in front of CCD chip such that 1st or 2nd image is recorded by that part of the chip and the other is recorded by the remainder (as in claim 18), - see D2 (figure 6);
- first CCD for first image, 2nd CCD for second image (as in claim 19), -see D2 (figure 5);
- chips are in close proximity (as in claim 20), -see D2 (figure 5);
- processing means are microprocessor based, having electrical memory means (as in claim 26), -see D2 (figures 5 and 6);

The subject-matter of dependent claims 32-35 lacks novelty for similar reasons as set out for the corresponding dependent apparatus claims, 2,10,6 and 17

respectively.

The subject-matter of claims 46-51 is also disclosed by D3. The operations of relating the different illuminants, and minimisation of the transform functions are all set out in sections 2-5 of D3.

Article 33(3) PCT

The subject-matter of some of the claims is considered to be obvious because the subject-matter of these claims is either known from the prior art documents D1-D3 or forms part of the common general knowledge of the skilled person. This will be set out below:

- wavelengths are at least 100nm apart (as in claim 5), -see D1 (column 9, lines 13-23);
- filter output is linearly related to its input (as in claim 11), -common design feature;
- CCD chips are responsive to substantially same frequencies (as in claim 21), - common general knowledge;
- use of beamsplitter (as in claim 21), -common general knowledge;
- filter in front of one of the CCD chips (as in claim 21), -common general knowledge;

Also the different housing arrangements as set out claims 22-24 are solutions the skilled person would readily apply, when confronted with the corresponding problem;

- chips are responsive to different frequencies of light (as in claim 25), - common general knowledge;
- provision of spectral characteristics of the illuminant light (as in claim 27), -see D3 (Section 2, Color Space Data Transforms);
- spectral characteristics are used to facilitate removal of some illuminant bias (as in claim 28), -see D3 (abstract);
- removal of demosaicing errors, interreflection or shadows (as in claim 29), - common general knowledge;
- use of physical characteristics of the scene (as in claim 30), -common general knowledge;

The features of the subject-matter of claims 36-44 is obvious because of the common general knowledge of the skilled person and the features disclosed in D3. In particular reference is made to Section 2 of D3 ("Color Space Data Transforms).

VII. Certain Defects

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D3 are not mentioned in the description.

2. Independent claims 1, 31 and 45 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

VIII. Certain Observations

Article 6 PCT

The relative terms (relatively broadband) used in the claims leaves the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of the claims unclear (Article 6 PCT). In addition when considering the passage on page 2, lines 8-25, in which contrary statements about the sensor means are made, it is no clear what subject-matter the applicants intend to protect.

Claims

1. Image recording apparatus (10) for processing an image, the apparatus including: optical sensor means (12) for recording a first digital optical image of at least a part of a scene (0) illuminated by an illuminant light and for recording a second digital optical image of at least a part of substantially the same scene under substantially the same illuminant light; the light producing the first and second images undergoing different optical processing; and means (18) in communication with the optical sensor means for processing information relating to the first and second images, wherein the processing means relates one of the first and second images to the other of the first and second images.

2. Image recording apparatus (10) according to claim 1 wherein the processing means (18) correlates the first and second images.

3. Image recording apparatus (10) according to any preceding claim wherein first and second optical sensor means (12) are provided for recording the first and second images respectively.

4. Image recording apparatus (10) according to claim 3 wherein at least one of the first and second optical sensor means (12) is relatively broadband optical sensor means, being responsive to at least two distinct wavelengths of light within a broad spectrum of wavelengths.

5. Image recording apparatus (10) according to claim 4 wherein the wavelengths are at least 100 nm apart.

6. Image recording apparatus (10) according to any preceding claim wherein the optical sensor means (12) includes at least two types of optically sensitive elements,

responsive to respectively different wavelengths of light.

7. Image recording apparatus according to any preceding claim wherein the optical sensor means (12) comprises a charge coupled device (CCD) chip, the chip comprising an array of photoelectric detector pixels.

8. Image recording apparatus according to claim 7 wherein the pixels have a broad response centering on a particular wavelength of light.

9. Image recording apparatus according to claim 7 or claim 8 wherein the CCD chip is coated with a filter (14).

10. Image recording apparatus according to any preceding claim wherein the optical processing means comprises an optical filter (14).

11. Image recording apparatus according to claim 10 wherein the filter (14) has characteristics such that its output is linearly related to its input.

12. Image recording apparatus according to claim 10 or claim 11 wherein the response of the filter (14) is a smooth function with respect to wavelength and the filter (14) has an average transmittance of more than 30%.

13. Image recording apparatus according to any of claims 10 to 12 wherein the filter (14) produces an output which includes relatively more light of one wavelength than of another wavelength as compared with the input.

14. Image recording apparatus according to claims 10 to 13 wherein the filter (14) is located in the image light path before the optical sensor means.

15. Image recording apparatus according to any preceding claim wherein first and second optical sensor means are provided by a single CCD chip (12) which records the first and second digital optical images.

16. Image recording apparatus according to claim 15 wherein the first and second sensor means may comprise respectively different parts of the chip (12).

17. Image recording apparatus according to claim 15 or claim 16 wherein the first and second images comprise different parts of the image recorded by the CCD chip (12), in spatial terms or in terms of the frequencies of light recorded.

18. Image recording apparatus according to any of claims 15 to 17 wherein a filter (14) is provided in front of or on a part of the CCD chip (12) such that the first or second digital optical image is recorded by that part of the chip, and the other of the digital optical images is recorded by the remainder of the chip.

19. Image recording apparatus according to any of claims 1 to 14 wherein the optical sensor means comprises a first CCD chip (12a) for recording the first digital optical image and a second CCD chip (12b) for recording the second digital optical image.

20. Image recording apparatus according to claim 19 wherein the chips (12a, 12b) are located in close proximity to one another, in the same geometric plane.

21. Image recording apparatus according to claim 19 or claim 20 wherein the two CCD chips (12a, 12b) are responsive to respectively substantially the same frequencies of light, the optical processing means comprising an optical beamsplitter for splitting the image light into two parts and for directing each part of the light towards a respective one of the CCD chips, and an optical filter (14) being located in the path of one part of the image light, before one CCD chip.

22. Image recording apparatus according to any of claims 19 to 21 wherein the optical sensor means and the optical processing means are located within a housing, such as a camera body.

23. Image recording apparatus according to any of claims 19 to 21 wherein

each CCD chip (12a, 12b) is provided in a separate housing, a first housing having a CCD chip (12b) provided therein and a second housing having a CCD chip (12a) and an optical filter (14) provided therein.

24. Image recording apparatus according to any of claims 19 to 21 wherein a first CCD chip is provided within a first digital camera and a second CCD chip is provided within a second digital camera, such that the different optical processing of the two images results from the different camera characteristics.

25. Image recording apparatus according to any of claims 19 to 24 wherein the two chips are responsive to respectively different frequencies of light.

26. Image recording apparatus according to any preceding claim wherein the processing means is microprocessor based, having electrical memory means.

27. Image recording apparatus according to any preceding claim wherein the processing means includes means for providing information relating to the spectral characteristics of the illuminant light.

28. Image recording apparatus according to claim 27 wherein information relating to the spectral characteristics of the illuminant light is used to facilitate removal of at least some of any illuminant colour bias present in the recorded image.

29. Image recording apparatus according to claim 27 or claim 28 wherein the processing means includes means for facilitating the removal of at least some of any demosaicing errors and/or interreflection errors and/or shadows present in the recorded image.

30. Image recording apparatus according to any of claims 27 to 29 wherein the processing means includes means for providing information relating to the physics of the scene, such as the physical characteristics of the scene.

31. A method for recording an image, the method including the steps of:
(a) recording a first digital optical image of at least a part of a scene illuminated by an illuminant light and recording a second digital optical image of at least a part of substantially the same scene illuminated by substantially the same illuminant light; the light producing the first and second images undergoing different optical processing; and

(b) processing information relating to the first and second images;
wherein the processing step includes relating one of the first and second images to the other of the first and second images.

32. A method for recording an image according to claim 31 wherein the first and second images are correlated.

33. A method for recording an image according to any of claims 30 to 32 wherein different optical processing results at least partly from the filtering of light producing the first or second image.

34. A method for recording an image according to any of claims 30 to 33 wherein the different optical processing is provided by the use of sensors responsive to respectively different frequencies of light in recording the first and second images.

35. A method for recording an image according to any of claims 30 to 34 wherein the first and second images comprise respectively different parts of a global image of a scene.

36. A method for recording an image according to any of claims 30 to 35 wherein the processing of the information relating to the first and second images provides an estimate of the spectral characteristics of the illuminant light.

37. A method for calibrating image recording apparatus, the method being

according to any of claims 30 to 36.

38. A method according to claim 37 wherein the method includes the carrying out of steps (a) and (b) for each of a plurality of different known illuminant lights and wherein step (b) includes the step of processing the information relating to the first and second images to provide an indication of the relationship therebetween.

39. A method according to claim 38 wherein the indication of the relationship is a transform function, which may be a transform matrix, and the method provides a set of reference transform functions, each transform function relating to a different known illuminant light.

40. A method according to any of claims 30 to 36 for processing an image recorded using image recording apparatus wherein the first and second images relate to a scene illuminated by an unknown illuminant.

41. A method according to claim 40 wherein the method includes the step of applying one or more of the reference transform functions to the first or second image and determining the reference transform function which best relates the two images.

42. A method according to claim 41 wherein each reference transform function is applied to the first image to produce a transformed first image, which is subsequently compared to the second image and the reference transform function which produces a transformed first image most closely resembling the second image is selected as the best reference transform function.

43. A method according to claim 42 wherein the known illuminant light to which the best reference transform function relates is determined, to provide information relating to the spectral characteristics of the light illuminating the scene to be recorded.

44. A method according to claim 43 wherein at least some of the colour bias due to the illuminating light is removed from the image of the scene to be recorded and/or at least some demosaicing errors and/or interreflection errors and/or shadows present in the recorded image are removed.

45. A method for recording an image with image recording apparatus and processing the recorded image of a scene illuminated by an illuminant light, the method including calibration steps of:

storing a digital response of an image recording apparatus to each of a plurality of colours of illuminant light $E(\lambda)$, in an electrical memory means;

grouping each colour of illuminant $E^a(\lambda)$ into a pair with a different colour of illuminant $E^b(\lambda)$, and for each pair of illuminants $E^a(\lambda)$ and $E^b(\lambda)$, calculating an illuminant transform function $T^{a,b}$, the transform function being the function which best maps the image recording apparatus response across the pair of illuminants, and recording the transfer function in an electrical memory means.

46. A method according to claim 45 wherein the number of pairs of illuminants is the same as the number of distinct illuminants, the second illuminant in each pair being defined in terms of the first.

47. A method according to claim 45 including the step of recording the responses of the image recording apparatus for a set of distinct illuminants $E(\lambda)$.

48. A method according to any of claims 45 to 47, the method further including the following image recording steps:

recording the responses of the image recording apparatus to image light (P_1) from a scene to be recorded and to optically filtered image light (P_2) from the scene;

determining which colour of illuminant $E(\lambda)$ is closest to the colour of the illuminating light, thereby estimating the colour of the illuminating light; and

removing at least some colour bias due to the illuminating light from the

recorded image and/or at least some of any demosaicing errors and/or interreflection errors.

49. A method according to claim 48 wherein the optically filtered image light is filtered using a filter which produces an output which includes relatively more light of one wavelength than the input.

50. A method according to claim 48 or claim 49 wherein the colour of the illuminating light is determined by applying each transform function T^{ρ} to the recorded response (P_1) of the apparatus to the image light and comparing the transformed response (P_1) to the response (P_2) of the apparatus to the filtered image light, the transform function which best relates the two responses being the function which identifies the colour of the image light and the filtered image light.

51. A method according to claim 50 wherein the best transform function is defined as the function which minimizes the error of the operation ($T^{\rho}P_1 - P_2$).

52. Image recording apparatus substantially as herein described with reference to Fig. 1 of the drawings.

53. Image recording apparatus substantially as herein described with reference to Fig. 2 of the drawings.

54. Image recording apparatus substantially as herein described with reference to Fig. 3 of the drawings.

55. A method substantially as herein described with reference to the drawings.

56. Any novel subject matter or combinion including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
RW/6863INT		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB99/01997	25/06/1999	27/06/1998
International Patent Classification (IPC) or national classification and IPC H04N9/73		
Applicant UNIVERSITY OF EAST ANGLIA et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 12 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☒ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
26/01/2000	18.10.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Schoeyer, M Telephone No. +49 89 2399 2136

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/01997

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-21 as originally filed

Claims, No.:

1-58 as originally filed

Drawings, sheets:

1/4-4/4 as originally filed

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 54-58.

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 54-58 are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

   ☐ restricted the claims.

   ☒ paid additional fees.

   ☐ paid additional fees under protest.

   ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with.

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

   ☐ all parts.

   ☒ the parts relating to claims Nos. 1-53.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1-5,7-11,13-21, 27,32-37,48-53
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-53
Industrial applicability (IA)	Yes:	Claims	1-53
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

III. No Opinion

It is not clear which subject-matter the applicants intend to protect in claims 54-58 because no technical features are defined in these claims. Thus no sensible opinion may be given for these claims.

IV. Lack of Unity

The International Preliminary Examining Authority agrees with the International Searching Authority that the present application relates to a group of inventions which are not so linked as to form a single inventive concept. Thus the requirements of Rule 13 PCT are not fulfilled (see also Form PCT/ISA/206 of 6 October 1999).

In particular it is noted that document D1 (EP-A-0 605 898) is concerned with an apparatus for processing an image and that the apparatus comprises (see column 2, line 49 ff.):
- optical sensor means for recording a first digital image of at least a part of the scene illuminated by an illuminant light and for recording a second digital optical image of at least a part of substantially the same scene under substantially the same illuminant light;
- the light producing the first and second images undergoing different optical processing; and
- means in communication with the optical sensor means for processing information relating to first and second images.

Since these are the technical features of claim 1, the subject-matter of this claim lacks novelty.

Claim 32 is directed towards a method in accordance with the apparatus of claim 1 so that substantially the same objections as of lack of novelty with were made for claim 1 apply to claim 32.

The following groups of claims were identified by the International Searching Authority:

1. Claim 1 with claims 2-27, claim 32 with claims 33-37;
2. Claim 1 with claims 28-31, claim 32 with claims 38-46, claims 47-53.

Since according to the above, the subject-matter of independent claims 1 and 32 lacks novelty, the common concept linking these groups of claims and which are represented by the subject-matter of independent claims 1 and 32 is not inventive.

Consequently, since the claims according to group 1 and group 2 do not share the same inventive concept, if any, (group 1 relates to a method of recording a scene, group 2 relates to the spectral characteristics of the illuminant light), the requirements of Rule 13.1 PCT are not fulfilled that the groups of inventions should be linked by a single inventive concept.

As the applicants have paid the additional examination fees without protest, the claims 1-53 have been considered for this report.

V. Statement under Rule 66.2(a)(ii)

Reference is made to the following documents:

D1: EP-A-0 605 898;
D2: US-A-5 045 928.
D3: FINLAYSON G D ET AL: 'CONSTRAINED LEAST-SQUARES REGRESSION IN COLOR SPACES' JOURNAL OF ELECTRONIC IMAGING,US,SPIE + IS&T, vol. 6, no. 4, page 484-493 XP000722192 ISSN: 1017-9909

Article 33(2) PCT

Document D1 is concerned with an apparatus for processing an image which comprises (see column 2, line 49 ff.):

- optical sensor means for recording a first digital image of at least a part of the scene illuminated by an illuminant light and for recording a second digital optical image of at least a part of substantially the same scene under substantially the

same illuminant light;
- the light producing the first and second images undergoing different optical processing; and
- means in communication with the optical sensor means for processing information relating to first and second images.

Since these are the technical features of claim 1, the subject-matter of this claim lacks novelty.

In a similar fashion the subject-matter of claim 1 is anticipated by D2 (see column 7, lines 15-44).

Claim 32 is directed towards a method in accordance with the apparatus of claim 1 so that substantially the same objections as of lack of novelty with were made for claim 1 apply to claim 32.

Document D3 is concerned with recording an image and processing the recorded image, the method including the calibration steps of:

- storing a digital response to each of the plurality of colours of illuminant $E(\lambda)$ (see section 2.1);
- grouping each colour of illuminant $E^a(\lambda)$ into a pair with a different colour of illuminant $E^b(\lambda)$, and calculating the transform function (see sections 2 and 3);

Since these are the technical features of claim 47, the subject-matter of this claim lacks novelty.

Dependent claims:

The subject-matter of some of the dependent claims also lacks novelty because the subject-matter of these claims is disclosed by D1 or D2 as will be set out below:

- processing means relates first and second images (as in claim 2), -see D1 (page 9, column 16, lines 26-39), D2 (claim 1);

- processing means correlates the first and second images (as in claim 3) , -see D2 (claim 1);
- first and second optical sensor means are provided for recording first und second images (as in claim 4) , -see D2 (figure 5);
- at least one of first and second optical sensor means is relatively broadband (as in claim 5) , -see D2 (figure 5);
- sensor means includes at least two types of optically sensitive elements (as in claim 7), -see D1 (column 9, lines 13-23);
- sensor means comprises a CCD (as in claim 8), -see D1 (column 1, lines 17-23);
- broad response centring on a particular wavelength (as in claim 9), -see D1 (column 2, line 35 ff.);
- optical processing means comprises an optical filter (as in claims 10, 11), -see D1 (column 2, line 35 ff.);
- filter response is smooth (as in claim 13), -see D1(figures 2-4);
- filter produces an output which includes relatively more light of one wavelength than of another (as in claim 14), -see D1 (e.g. figure 4);
- filter is located in image light path (as in claim 15), -see D1 (column 2, line 35 ff.)
- single CCD chip (as in claim 16), -see D2 (figure 5);
- 1st and 2nd sensor means may comprise different parts of the chip (as in claim 17), -see D2 (figure 6)
- first and second images comprises different parts of the recorded images (as in claim 18), -see D2 (figure 6);
- filter is provided in front of CCD chip such that 1st or 2nd image is recorded by that part of the chip and the other is recorded by the remainder (as in claim 19), -see D2 (figure 6);
- first CCD for first image, 2nd CCD for second image (as in claim 20), -see D2 (figure 5);
- chips are in close proximity (as in claim 21), -see D2 (figure 5);
- processing means are microprocessor based, having electrical memory means (as in claim 27), -see D2 (figures 5 and 6);

The subject-matter of dependent claims 33-37 lacks novelty for similar reasons as set out for the corresponding dependent apparatus claims, 2,3,11,7 and 17 respectively.

The subject-matter of claims 48-53 is also disclosed by D3. The operations of relating the different illuminants, and minimisation of the transform functions are all set out in sections 2-5 of D3.

Article 33(3) PCT

The subject-matter of some of the claims is considered to be obvious because the subject-matter of these claims is either known from the prior art documents D1-D3 or forms part of the common general knowledge of the skilled person. This will be set out below:

- wavelengths are at least 100nm apart (as in claim 6), -see D1 (column 9, lines 13-23);
- filter output is linearly related to its input (as in claim 12), -common design feature;
- CCD chips are responsive to substantially same frequencies (as in claim 22), - common general knowledge;
- use of beamsplitter (as in claim 22), -common general knowledge;
- filter in front of one of the CCD chips (as in claim 22), -common general knowledge;

Also the different housing arrangements as set out claims 23-25 are solutions the skilled person would readily apply, when confronted with the corresponding problem;

- chips are responsive to different frequencies of light (as in claim 26), - common general knowledge;
- provision of spectral characteristics of the illuminant light (as in claim 28), -see D3 (Section 2, Color Space Data Transforms);
- spectral characteristics are used to facilitate removal of some illuminant bias (as in claim 29), -see D3 (abstract);
- removal of demosaicing errors, interreflection or shadows (as in claim 30), - common general knowledge;
- use of physical characteristics of the scene (as in claim 31), -common general knowledge;

The features of the subject-matter of claims 38-46 is obvious because of the common general knowledge of the skilled person and the features disclosed in

D3. In particular reference is made to Section 2 of D3 ("Color Space Data Transforms).

VII. Certain Defects

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D3 are not mentioned in the description.

2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

3. Independent claims 1, 32 and 27 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

VIII. Certain Observations

Article 6 PCT

The relative terms (relatively broadband) used in the claims leaves the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of the claims unclear (Article 6 PCT). In addition when considering the passage on page 2, lines 8-25, in which contrary statements about the sensor means are made, it is no clear what subject-matter the applicants intend to protect.